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likely on account of their practically identical proper motion, the absolute magnitude of the faint star is +10.9 and the distance from the principal star 5860 times the distance Sun-Earth.

A. VAN MAANEN.

#### TEN SPECTROSCOPIC BINARIES.

The binary character of the following stars has been established by measurements of their radial velocities on recent spectrograms:

<i>Star</i>	<i>Mag.</i>	<i>a</i> (1900)	<i>δ</i> (1900)	<i>Spec.</i>	<i>Range</i> <i>km.</i>
Boss 2193	5.8	8 <sup>h</sup> 10.6 <sup>m</sup>	+ 62° 49'	G5	— 19 to + 23
A.G.Cam. 3591	6.5	10 7.3	+ 50° 59'	A4	— 82 to + 37
Boss 4573	5.8	18 0.7	— 8° 20'	B8	— 50 to + 12
Boss 4669	5.6	18 22.1	+ 29° 46'	A4	— 10 to + 40
Boss 4821	5.8	18 54.6	+ 38° 8'	B7	— 90 to + 40
Boss 5150	5.7	20 0.7	+ 31° 56'	Composite	
Boss 5160	6.1	20 3.1	— 10° 21'	Composite	
A.G.Cam. 6486	7.4	20 15.9	+ 55° 5'	F3	— 31 to + 3
Boss 5890	5.8	22 45.9	+ 41° 25'	Composite	
Boss 6129	6.6	23 47.5	+ 74° 59'	Composite	

The period of Boss 4821 is probably of the order of three days. Plates taken on successive nights show a large variation.

The hydrogen lines in the spectrum of Boss 5150 give values differing systematically from those of the helium, silicon, and oxygen lines. The spectrum is B1p.

A faint component is visible on several of the photographs of Boss 5160. The maximum separation observed amounts to about 160 km. The spectrum is A1p.

Measures of a second component on one plate of Boss 5890 give a relative velocity of 190 km. The spectral type is B3p.

The star Boss 6129 is  $\beta$  996. The star has a proper motion of 0".332 annually. The spectrum is K3p and shows marked variations in the intensities of many of its lines. The spectroscopically determined parallax is +0".132, but on account of the variations in the spectrum separate plates show considerable differences.

W. S. ADAMS,

A. H. JOY.

#### TWO STARS WITH REMARKABLE RADIAL VELOCITIES.

Measurements of the spectra of two stars observed recently show the following velocities:

	<i>Mag.</i>	<i>Spec.</i>	$\mu$	<i>Velocity</i> <i>km.</i>	<i>No. Plates</i>
A. G. Ber. B. 1366	8.9	F0	0".51	+ 339	4
A. G. Ber. A. 1866	9.0	F9	0.76	— 190	4

The first of these stars has the largest constant radial velocity hitherto observed. Some years ago the star Lalande 1966 was found to have the velocity  $-325$  km. Its spectrum is also of the F type.

Both stars appear in van Maanen's list of stars with large proper motions.

W. S. ADAMS,  
A. H. JOY.

#### FIVE NEW VARIABLE STARS IN GLOBULAR CLUSTERS.

The following variable stars have been found on photographs of clusters made with the 60-inch reflector by Mr. Shapley. The distances from the center of the clusters are approximate, but are probably sufficient for identification, altho three of the variables have neighboring stars with which they might be confused. Southwest of the variable in N. G. C. 4147 are two bright stars, the nearer of which is  $3''$  south and  $3''$  west. A bright companion to the variable star in N. G. C. 6229 is east  $11''$  and north  $3''$ . A faint triplet near the second variable in N. G. C. 6981 is north  $3''$  and west  $9''$ .

Cluster	Designation of Variable	Position		Photographic Magnitude	
		$\Delta\alpha$	$\Delta\delta$	Bright	Faint
N.G.C. 4147	1	$+1''$	$+18''$	16.5	17.1
6229	1	$-5$	$-38$	15.4	15.8
6712	1	$-67$	$-8$	15.9	16.7
6981	1	$-42$	$-55$	16.3	17.3
	2	$-18$	$-38$	15.6	16.4

There is only one other star in N. G. C. 6229 brighter than the variable when it is near maximum. The other four variables range from the tenth to the thirty-fifth brightest in their respective systems. No other variables have been recorded in these clusters.

HELEN DAVIS.

#### THE PARALLAX OF THE RING NEBULA IN LYRA.

A study of the parallax of the ring nebula in *Lyra* has just been completed by the measurement and reduction of a long series of Crossley plates.<sup>1</sup> The result is a parallax of  $0''.015$ , and there are certain indications that even this very small value is probably

<sup>1</sup>Published in *Lick Observatory Bulletin* No. 299, October 16, 1917.